



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Clean Water Management



Multi-disciplinary Approaches to Biomonitoring of Large Rivers

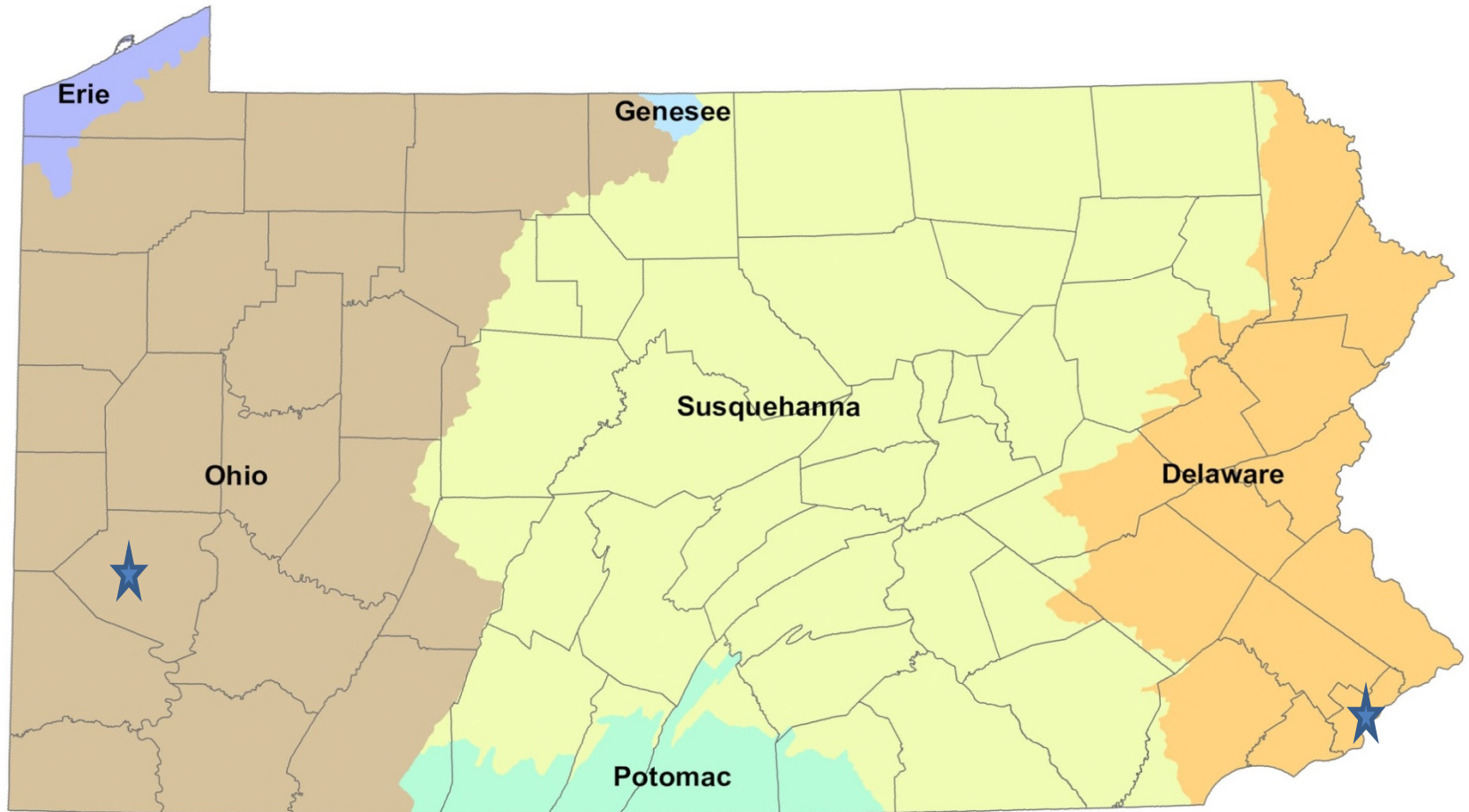
Large River Sampling in Pennsylvania

2014 NWQM Conference

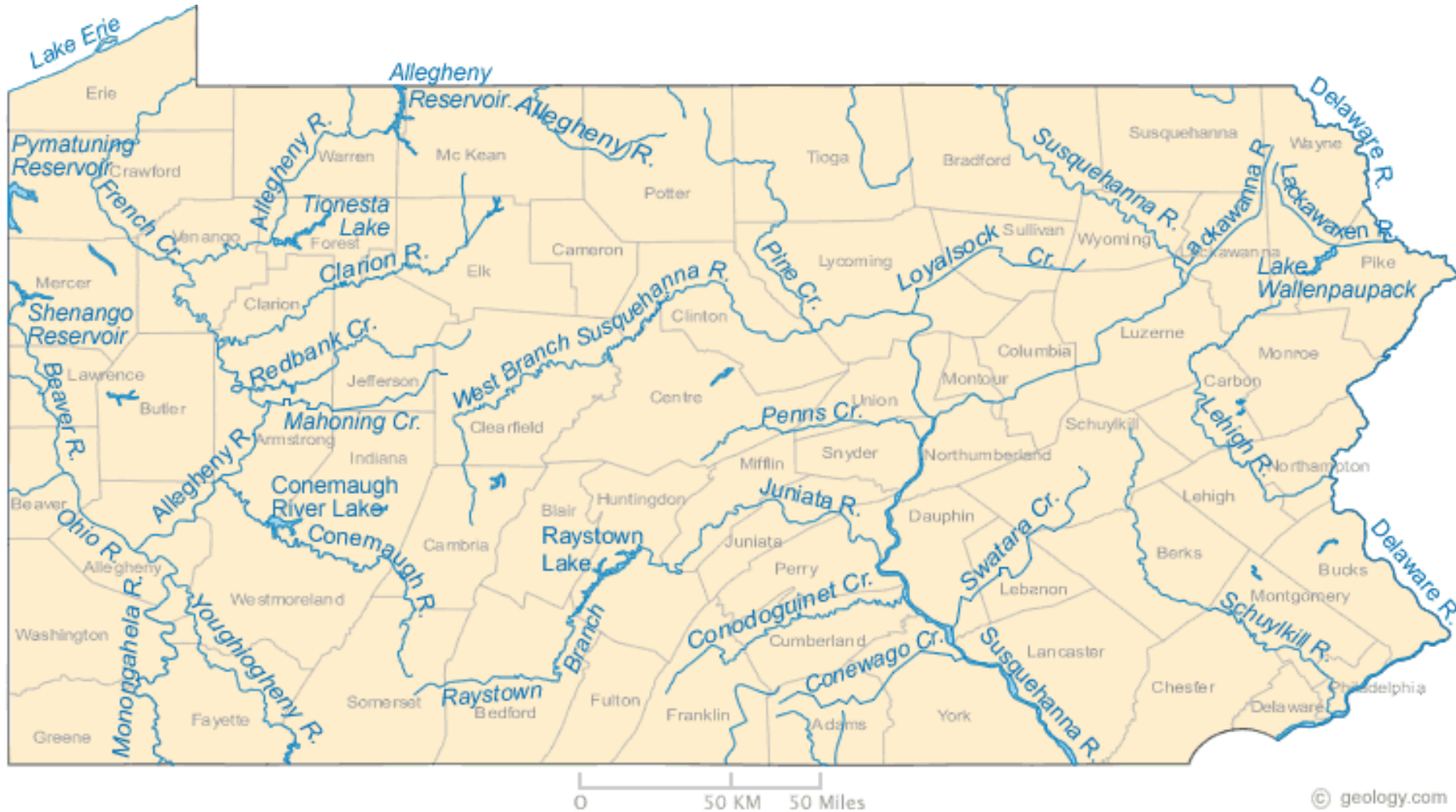
April 30, 2014

Rick Spear

Pennsylvania's Major Watersheds

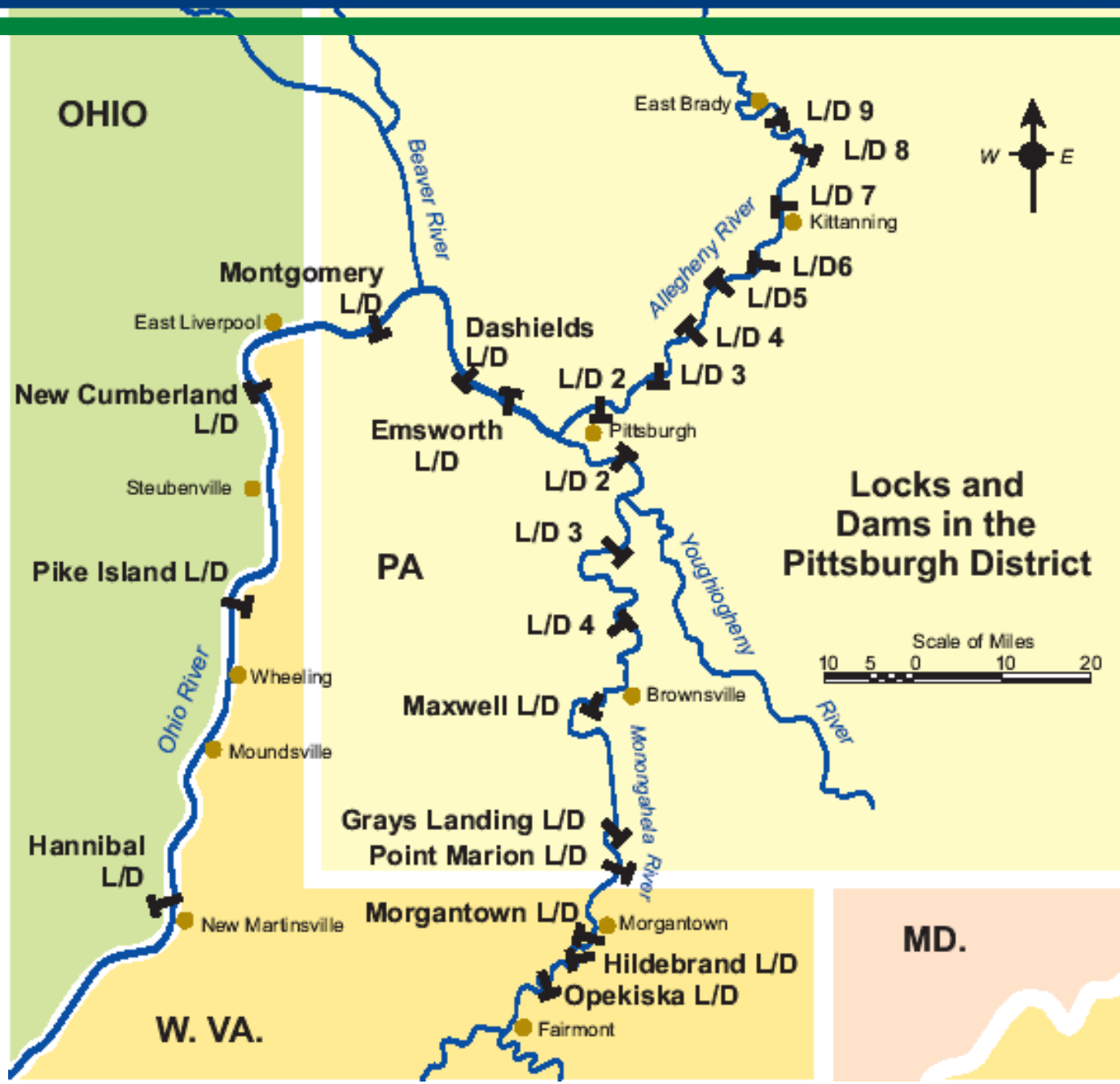


Major Rivers

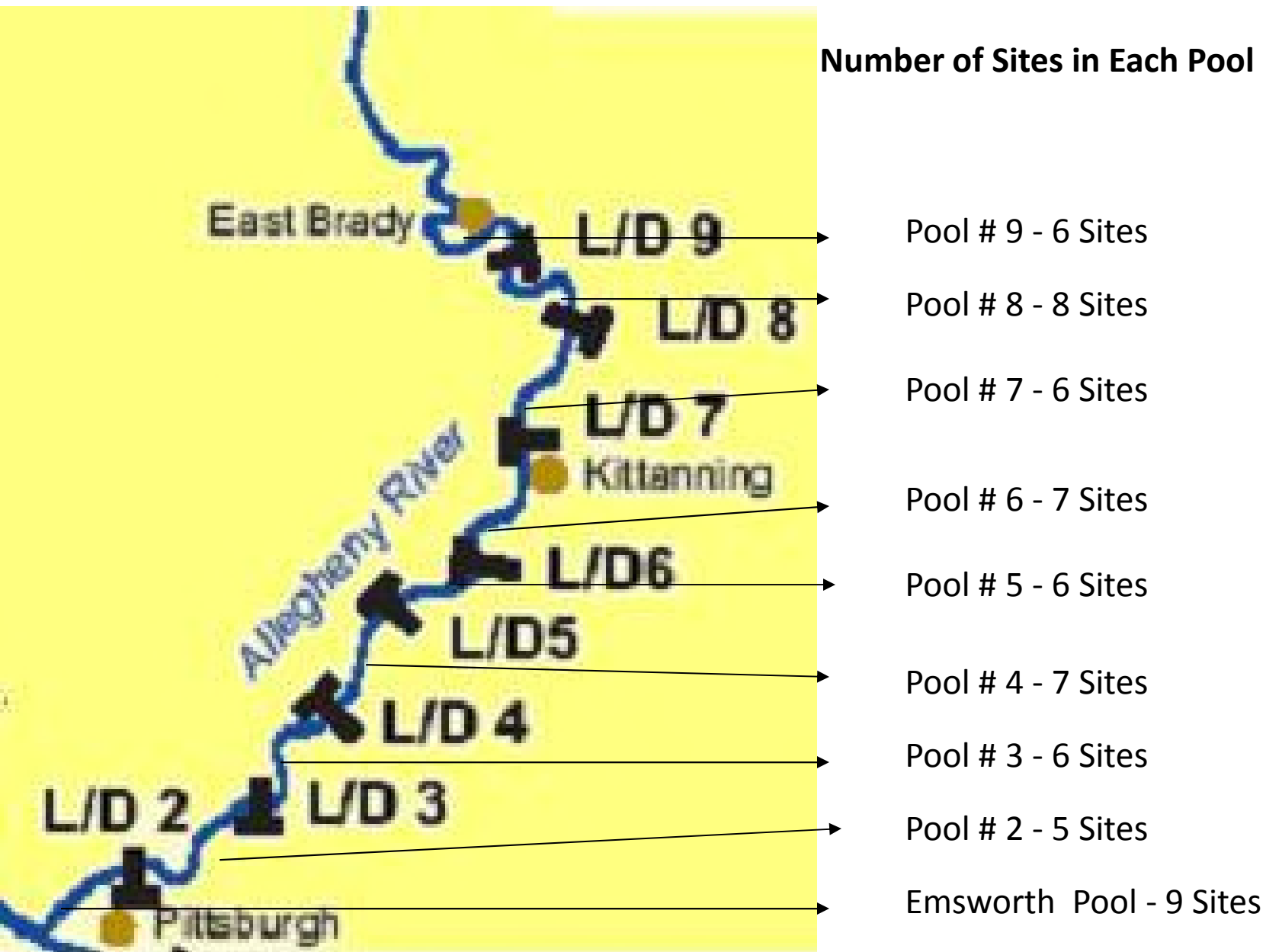


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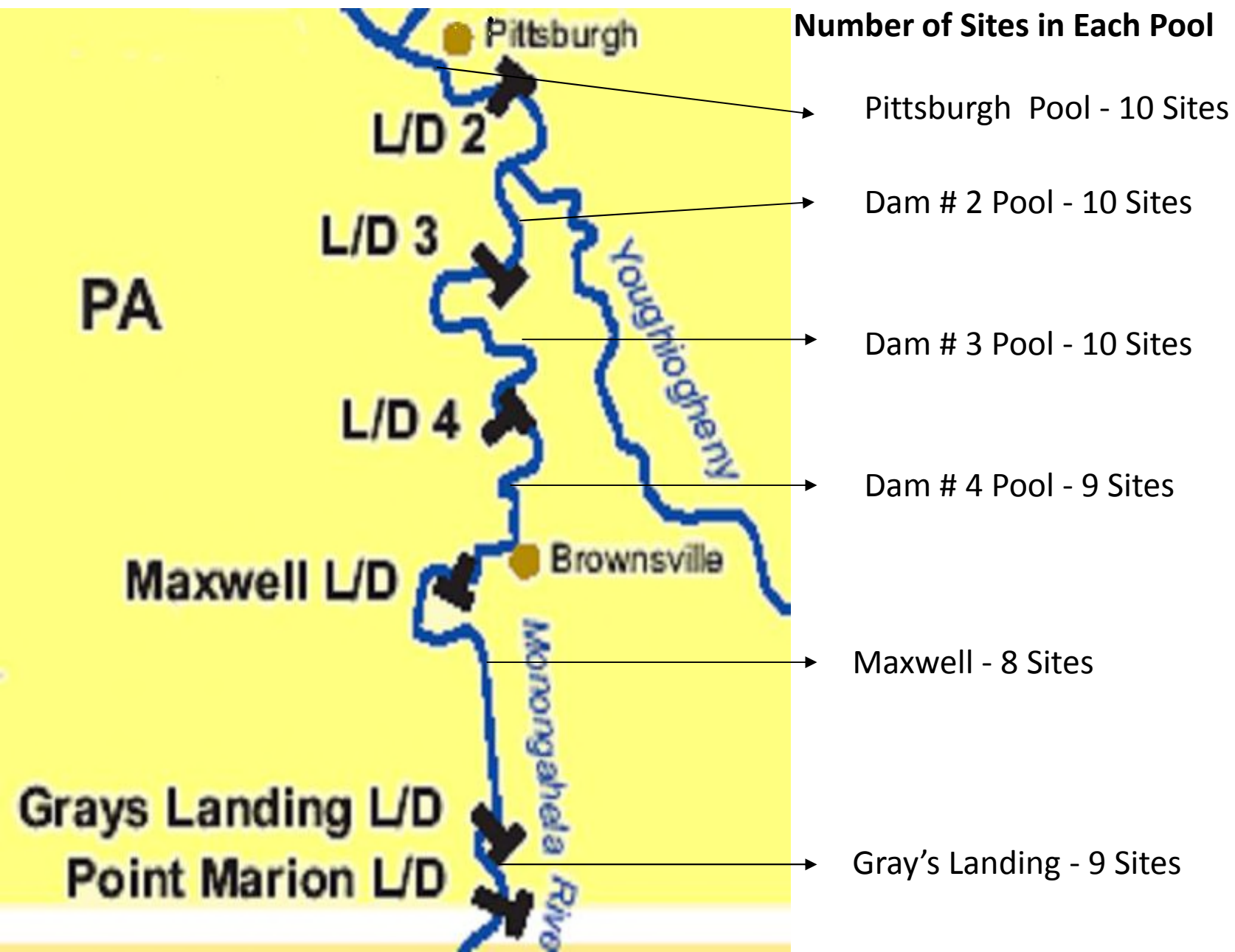
Locks and Dams in Pittsburgh Area



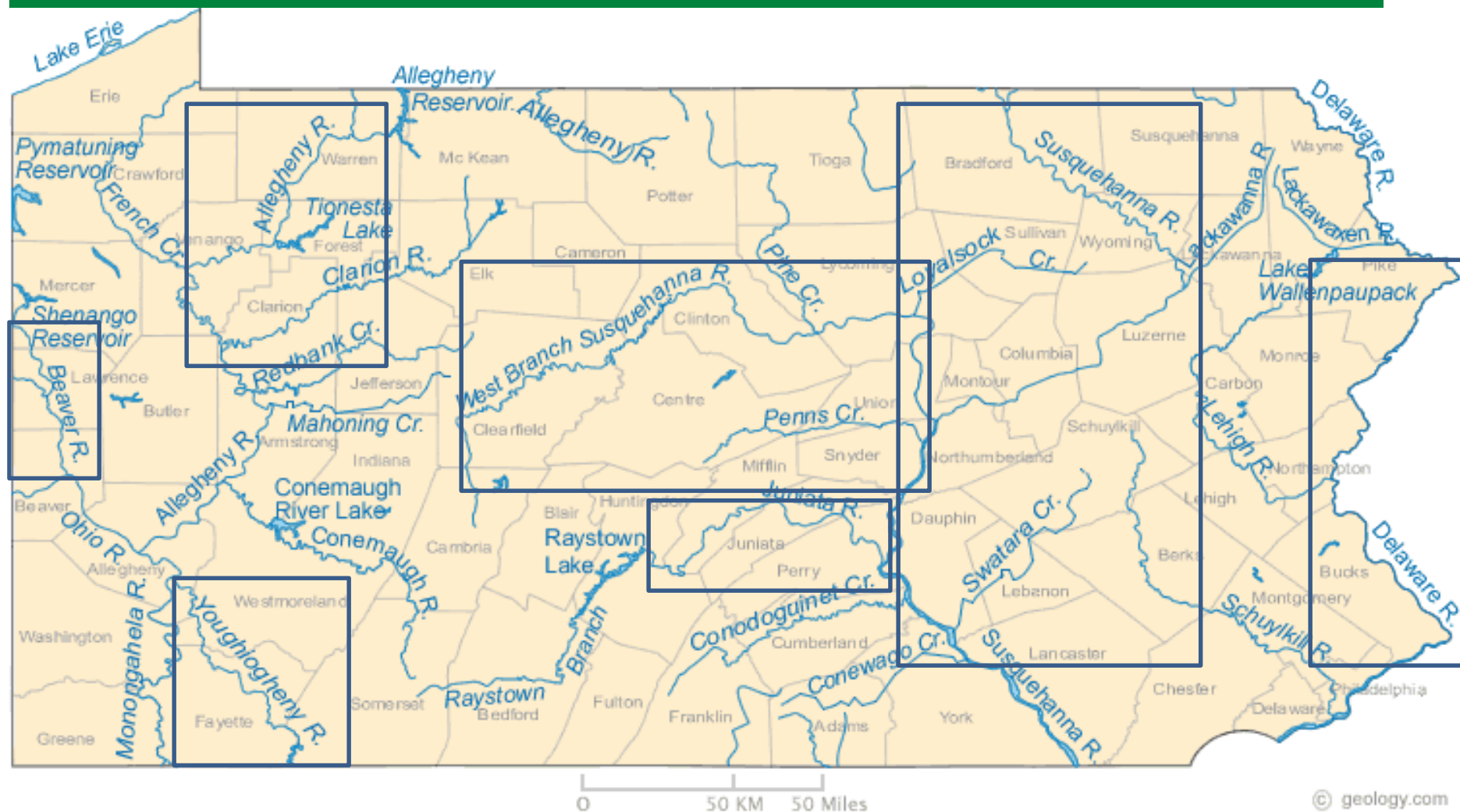
Allegheny River Pool Sites in 2008-2009



Monongahela River Pool Sites in 2008-2009



Other Rivers Sampled in 2010-2013



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Benthic Trawling

Conducted 3 two minute trawls staggered from shore to mid-channel

Collected benthic animals that were underrepresented such as Darters and Silver chubs

Freshwater Mussel Surveys

Performed 12 five minute random dives

Benthic Trawling

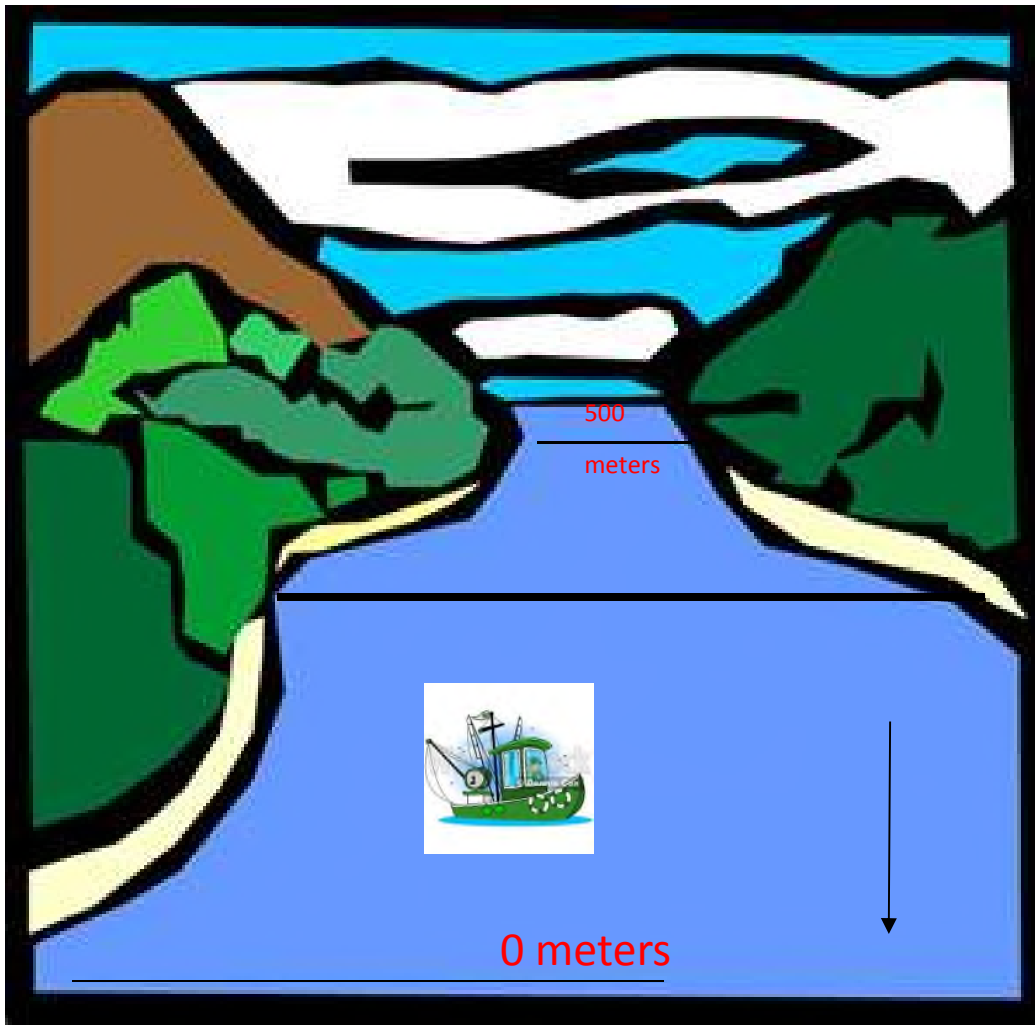


Mussel Sampling



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Mussel Sampling

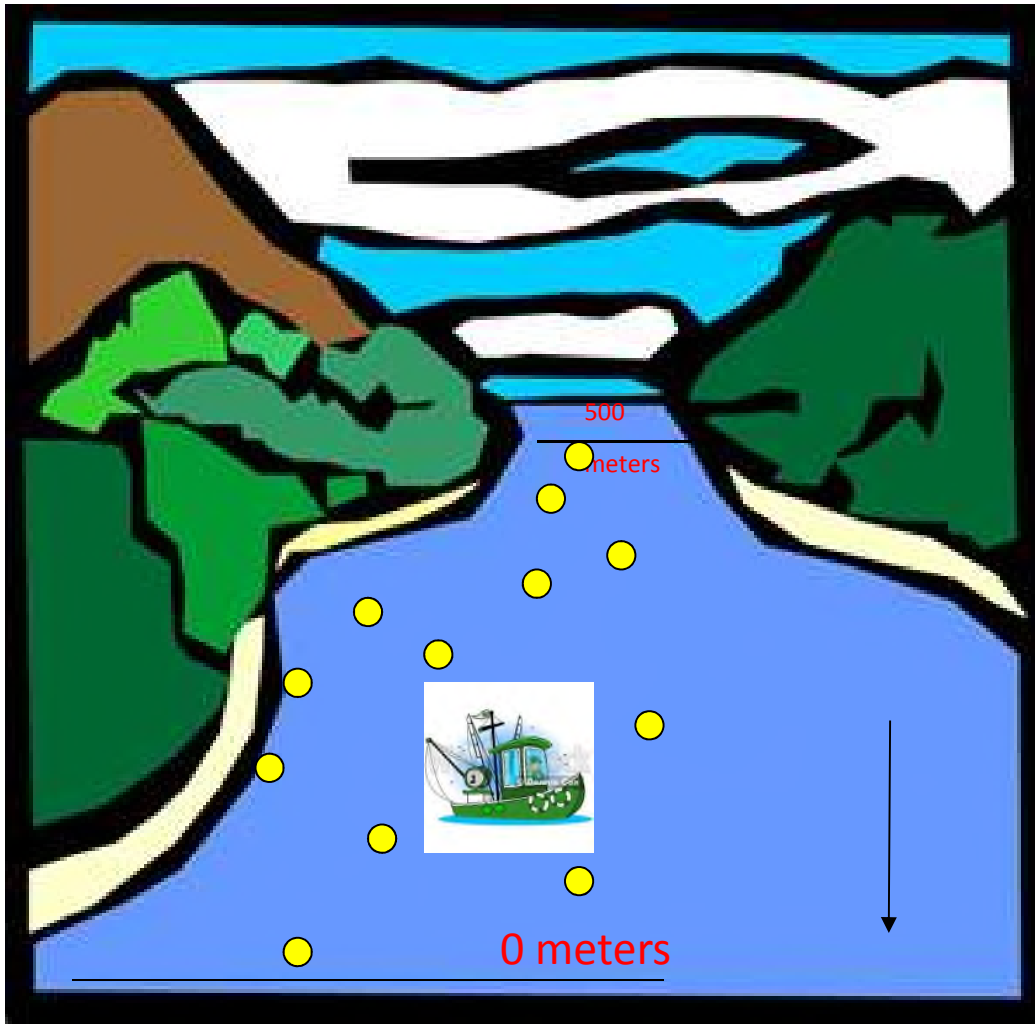


Sampling in larger rivers is typically done with transects lines. Transect lines are set $\frac{1}{2}$ meter on each side and set into 10 meter sections and sampled for 15 minutes.

Transect Line



Mussel Sampling



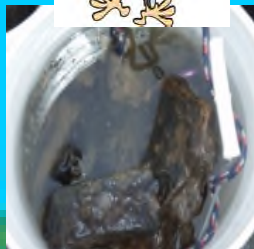
Experimental sampling technique to cover the 500 meters sampling site

Determine if there is any correlation to bugs, fish, water chemistry and sediment

12 random sites are chosen

They are from the shoreline out 50 meters and from the downstream point. At least 4 sites in less than 10 feet of water









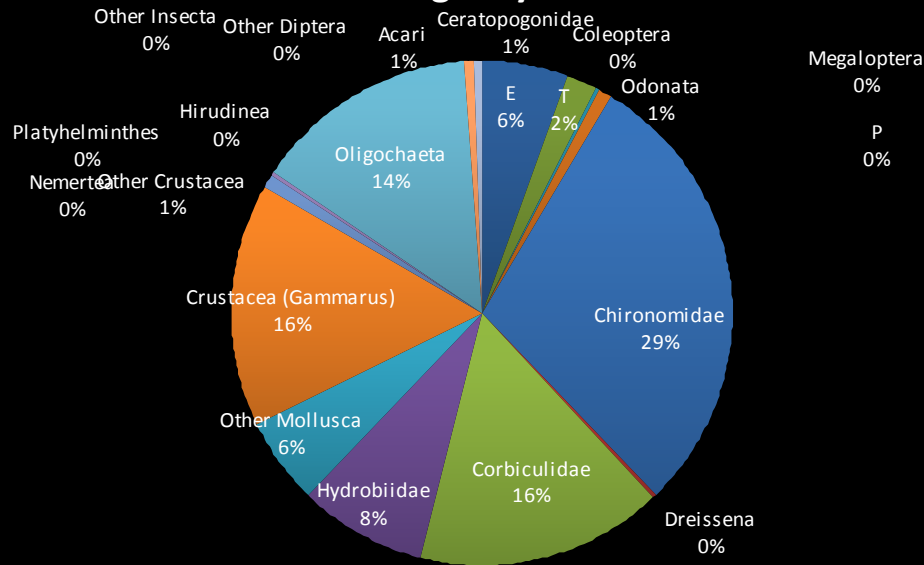
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Macroinvertebrate IBI

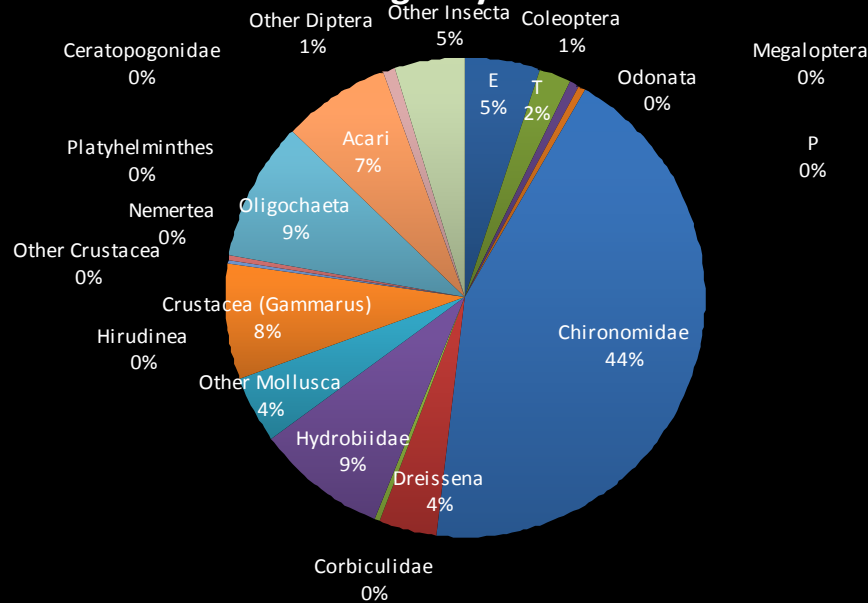
Continuing to work on using Commonwealth data with existing IBIs from ORSANCO and EMAP-GRE



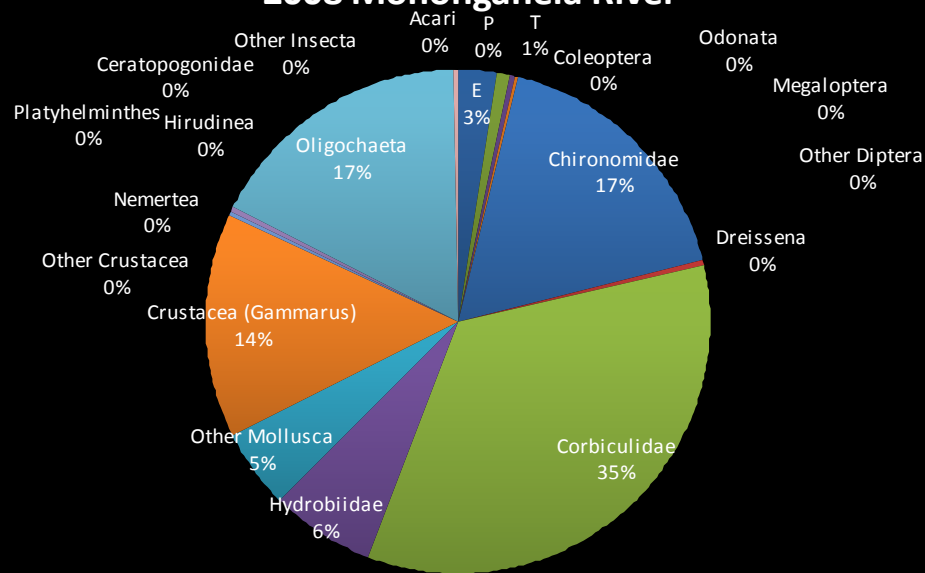
Allegheny 2008



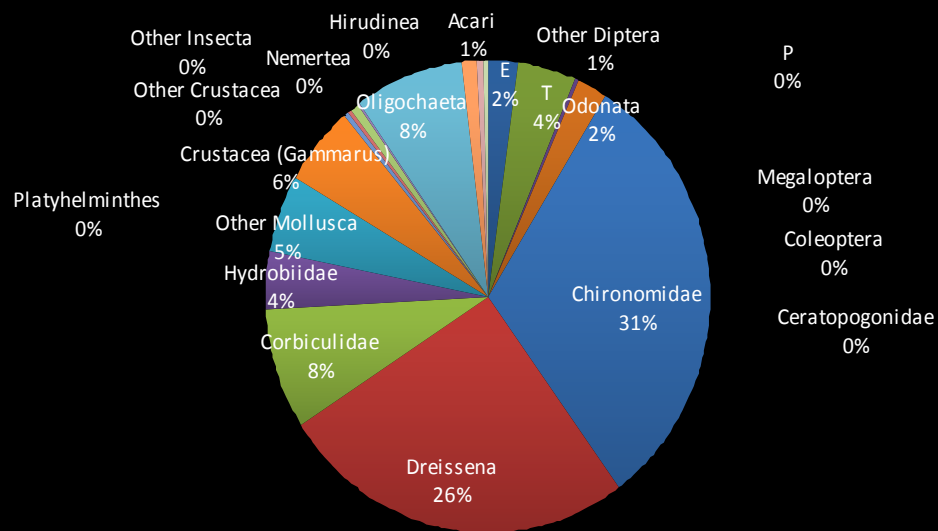
Allegheny River 2009



2008 Monongahela River



2009 Monongahela River



Monongahela River Mussel Results 2008

Live Species	Pool 1	Pool 2	Pool 3	Pool 4	Maxwell Pool	Grays Landing	Total
						Pool	
Total # of individuals	23	72	14	25	20	2	156
Total # of species	6	2	2	3	1	2	7
Total # of sites	6	6	5	7	6	4	34

Allegheny River Mussel Results 2009

Live Species	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8	Pool 9	Total
Total # of individuals	125	64	52	22	164	183	99	37	167	913
Total # of species	11	11	10	4	11	10	8	6	8	20
# of sites	6	3	5	2	5	3	5	4	4	37

Beaver and Youghiogheny Mussels



2008 and 2009 Fish Results

Allegheny 2008	Pool 1	Pool 2	Pool 3	Pool 4	Pool 5	Pool 6	Pool 7	Pool 8	Pool 9	Total
# of individuals	266	309	141	482	638	1658	372	1127	354	5347
# of species	24	28	15	32	29	38	29	38	24	56
Allegheny 2009										
# of individuals	441	200	867	70	785	688	772	920	1010	5753
# of species	34	27	35	21	34	30	37	34	36	55
Monongahela 2008	Pool 1	Pool 2	Pool 3	Pool 4	Maxwell	G L Pool	Total			
# of individuals	340	153	555	557	345	301	2251			
# of species	28	24	31	31	29	25	48			
Monongahela 2009										
# of individuals	1615	1527	5036	691	502	1560	10931			
# of species	28	33	37	27	30	22	45			

Great Rivers Fish Index (GRFIns) EPA Ohio River

- Multimetric Fish Assemblage Index to measure ecological condition
- 2 - 500 meter reaches
- Daytime Boat Electrofishing
- Unequal spatially balanced survey design
- 10 Metrics
- Continuous 0 to 10 scale
- Total score is out of 10
- Use stressor metrics

Modified Ohio River Fish Index (mORFIn) ORSANCO

- Multimetric Fish Assemblage Index to measure ecological condition
- 1 - 500 meter reach
- Nighttime Boat Electrofishing
- Unequal spatially balanced survey design
- 13 Metrics
- Continuous 0 to 60 scale
- Total score is out of 60
- Final score incorporates habitat class

Lessons Learned

- In rivers less than 6 feet deep the Department found that there is no need for benthic trawling. In these conditions electrofishing yields all fish.
- In rivers less than 3 feet deep the Department determined snorkeling should be used instead of SCUBA diving.
- Due to the 2 existing IBIs that were used with Pennsylvania data, the results indicate that Pennsylvania will have to develop our own large river fish IBI.

► You never know what you might find!





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